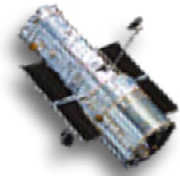


# Hubble Facts

HST Program Office

Goddard Space Flight Center  
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## POST-SERVICING OPERATIONS

Following completion of Servicing Mission Orbital Verification after SM4, the Hubble Space Telescope (HST) Program Office will be reorganized. The organization previously responsible for planning servicing missions will go out of business, and full responsibility for continuation of the Hubble mission in the post-servicing era will be turned over to the current HST Operations Project. This organization will have responsibility for Post-Servicing Operations (PSO). The key objective will continue to be safe operation of the Hubble observatory and its instruments and flight systems with high scientific return. The major components of Post-Servicing Operations are science operations and mission operations/sustaining engineering; each is described below.

### Science Operations

The Space Telescope Science Institute (STScI) in Baltimore, Maryland, performs Hubble science operations and manages the science program. During PSO, science operations exclusive of science grants will cost about \$44 million each year (value is in Fiscal Year 2006 dollars). Major areas include the following:

**Execution of the science program:** The STScI will continue to solicit and manage the evaluation and selection of proposals for HST research. Currently, the STScI receives over 1,000 proposals for each annual cycle, with a 7:1 oversubscription rate, and awards between 300 and 400

science grants in each cycle. New instruments are expected to continue to attract significant science interest in the science program.

**Planning and scheduling:** The STScI will continue to conduct long-range science planning, science calendar development, science command plan development, and spacecraft command loads generation. The STScI typically exceeds its 35 percent scheduling efficiency requirement by a wide margin, as it strives to optimize science delivery and also to take full advantage of targets of opportunity. Currently, the STScI implements about 25 target-of-opportunity observing programs (e.g., supernovae and gamma ray bursts) per observing cycle, on as little as 24-hours notice.

### Science data processing and data

**archiving:** The STScI will continue to process and archive over 80,000 observations per year. The archive, already quite large at 12 terabytes (TB) of data and growing at a rate that exceeds 2.6 TB per year, is assuming ever-greater popularity with the science community. The STScI currently supports ~300 archive requests per week, and current retrievals exceed 9 TB of data per year. At mission end, the Hubble archive is expected to hold 35 to 40 TB.

### Science operations sustaining

**engineering:** The STScI will continue to provide engineering and maintenance support for the many systems that support science operations. Among others, these

include the Astronomer's Proposal Tool, Long-Range Science Planning Tool, Moving Object Scheduling System, Science Planning and Scheduling System, Guide Star Selection System, Science Commanding System, Mission Scheduler, Command Loader, Starview, On-the-Fly Reprocessing System, and the Grants Management System.

The science operations budget supports the Flight Operations Team, working round-the-clock operations from the STScI; the planning and implementation of the science instrument calibration program, and support for Hubble anomaly investigations.

## **Mission Operations and Sustaining Engineering**

The Hubble Program will continue to provide systems management and engineering support for the observatory and its instruments and flight systems, assuring system-wide coordination for all major spacecraft configurations and ground system changes. Lockheed Martin Space Systems Company currently provides this support, under the Consolidated Hubble Associated Mission Products (CHAMP) contract. During PSO, continuing mission operations and sustaining engineering requirements are expected to cost about \$21 million each year (value is in Fiscal Year 2006 dollars), for support in the following areas:

**Systems Management:** Requirements will continue for system-wide coordination of all operations functions, spacecraft and instrument hardware particularly as the system degrades, flight software and ground system changes.

**Flight Systems Engineering:** All areas of Hubble operations (instrumentation and communication, data management, pointing control, sensors and calibration, safemodes, optical telescope assembly; science

instruments; electrical power and mechanisms, thermal control) will continue to require flight systems engineering support for evaluation of overall subsystem performance, trending, anomaly recovery, investigation of observatory and science instrument anomalies; maintenance of engineering analysis tools and in-house simulation capabilities.

## **Flight Software and Test Facility**

**Support:** As flight hardware systems degrade through PSO, flight software and test facility support will assume a more imperative role in maintaining the health and safety of Hubble and in maximizing science data. This area includes systems engineering and analysis, flight software algorithm and code development and validation, simulation facilities and tools maintenance, and flight software configuration management.

## **Ground Systems Engineering:**

Maintenance of the HST ground system, including applications for command and control, calibration, database development, and on-call anomaly response, will also face increased challenges as flight hardware systems degrade and the total system ages. Ground systems engineering also plays a pivotal role in maintenance and security for a ground system network with aging equipment and operational computer resources.

During PSO, the HST Program will meet the challenge to provide a world-class ultraviolet-optical-near infrared observatory to the astronomical community, together with its science operations and mission operations/sustaining engineering team.